USAIC & Fort Huachuca
Wildlife Management Office

Arizona Game and Fish Department
Heritage Grant [U20003]

Reduction of nuisance skunks in an urbanized area

A portion of the cantonment area at Fort Huachuca Military Reservation showing officers quarters, parade ground and barracks. Many of these structures are listed on the National Historic Register, and also provide shelter for skunks, raccoons, and other wildlife.

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Abstract

Skunks are often considered nuisance animals within urban areas. This study attempted to identify ways to reduce the numbers of skunks within a small, urbanized area at Fort Huachuca Military Reservation, Arizona. Nine skunks were captured within the cantonment area, vaccinated and radiocollared, then transplanted into an area where a population of radiocollared skunks had been monitored for > 4 months. At the end of the 3-month experiment, only 2 skunks remained in the release area, 2 were back in the cantonment area, 3 were dead, and 2 were lost to monitoring. However, effects on the resident population appeared negligible: survival rates of residents did not differ before and after the transplant, and shifts in denning areas were minor. Radiotracking skunks within the cantonment area revealed buildings frequented by both skunks and raccoons. Skunks also were frequently located in the underground drainage system and under road culverts. Translocation has serious risks for potential disease transfer; options are presented for reducing skunk density and reducing risks of disease transfer.

Acknowledgments

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Introduction

Striped skunks (*Mephitis mephitis*) are major reservoirs of the rabies virus, and account for a substantial number of animal-to-human exposures each year (Aranda and Lopez-de Buen, 1999; Krebs at al., 1995). During the last couple of decades, an average of 1-2 people have died from rabies each year in the United States, and during 1999-2000, 74 people were given post-exposure prophylaxis following exposure to rabid animals (Centers for Disease Control, http://www.cdc.gov/ncidod/dvrd/rabies/Introduction/intro.htm (Sept. 2002)). Skunks account for about 30% of wildlife confirmed with rabies, however most human exposures are due to contact with rabid bats.

Southeastern Arizona is home to four species of skunks. Although the space use and behavior of striped skunks have been studied in other regions of the United States (Bixler, 1997; Greenwood et al., 1997; Lariviere and Messier, 1997, 1998; Sargeant et al., 1982), little is known of the ecology of striped skunks in the arid southwest. Likewise, little is known of the ecology of the hooded skunk (*Mephitis macroura*), the hog-nosed skunk (*Conepatus mesoleucus*), and the western spotted skunk (*Spilogale gracilis*) in this area. Only one study has focused on the ecology of these species in sympatry (Patton, 1974). It is known, however, that skunks maintain an enzootic level of rabies within populations throughout southeastern Arizona and Mexico, with epizootics occurring periodically (Aranda and Lopez-de Buen, 1999; M. Leslie, ADHS, pers. comm.). Ecological factors that may influence epizootics of rabies include population density, home range size, and dispersal distances (Hanlon et al., 1999). Skunks are often attracted to housing areas, due to the presence of pet food, water, garbage, and abundance of invertebrates in well-watered vegetation. Current management recommendations for reduction of problems caused by skunks within residential areas include repellants, reduction of attractants such as food and water, limiting access to shelter (California Center for Wildlife, 1994), population reduction (Pybus, 1988; Rosatte et al., 1986), and vaccination (Krebs et al., 2000; Rosatte et al., 1992).

Animals that readily occupy urban areas, including skunks and raccoons, may achieve high densities due to increased food and water, and decreased natural predation. These higher densities may increase disease transmission among animals, and between animals and people. Local population reduction, either by reducing attractants and shelter, or by actively removing animals, may be an effective means of reducing the risk of human exposure to rabies and other wildlife diseases (Pybus, 1988; Rosatte et al., 1986).

Fort Huachuca and the City of Sierra Vista have conducted routine trapping operations to reduce nuisance skunks and survey the prevalence of rabies near housing areas for many years. Between 1991 and 1997, Sierra Vista submitted 147 skunks for testing, of which 35 (24%) were positive; whereas Fort Huachuca submitted 140 for testing, with 10 testing

positive (7%) (unpublished data from Arizona Department of Health Services). Annual prevalence ranged from 0 to 44% in Sierra Vista and 0 to 26% at Fort Huachuca.

Rabies is a widespread concern among residents of Fort Huachuca and surrounding areas (numerous conversations with hikers, Post employees and residents.). In addition, many people are offended by skunk odor, and ask nuisance trappers from the Pest Management Office to remove skunks when they are detected in or near buildings on Post. However, the most common concern appears to be with equating skunks with rabies, rather than simple dislike of the animals.

No formal protocol exists for dealing with vertebrate pests on Post. According to the Installation Pest Management Plan (Gabel, 1995),

"Vertebrate pests of turf, such as gophers and skunks, are controlled by trapping and/or eliminating their food source (grubs) through chemical application to the soils" (p. 12);

and,

Survey and control of various pests in offices, barracks, recreation centers, industrial workshops, chapels, nurseries, etc., are handled on an as-needed basis" (p. 13).

Currently, a call into the Pest Management Office with a concern about a skunk usually results in efforts to remove the animal with a live trap. No efforts are made to educate the caller about nuisance wildlife issues, nor are any efforts made to limit access to the area for skunks or other nuisance wildlife.

Capturing skunks in the cantonment area does not appear to pose a problem, but what to do with captured animals does. Current options include translocating skunks to a distant area for release, or submitting to Fort Huachuca Veterinary clinic for euthanasia. The latter option is not popular among the Post veterinarians or the public, and it is not known what effects removal of skunks has on the numbers or movements of remaining animals. Translocation of potentially rabid animals may quickly spread the virus through the "wild" population, actually increasing the public exposure to higher levels of the disease than had the skunks been left in place. In addition, the fate of translocated animals, as well as resident animals in the area of release, is unknown (Conover, 2002; Craven et al., 1998). If animals return at a high frequency, than a translocation program is not cost effective.

Objectives

The primary objective of the study was to reduce the density of skunks within the cantonment area (built up area of residential and work structures) of Fort Huachuca, by reducing attractants such as food, water, and shelter. Changes in densities of skunks were to be

measured before modifications and after. Secondary objectives included collecting data on the species, sex, and age composition of skunks in the housing area.

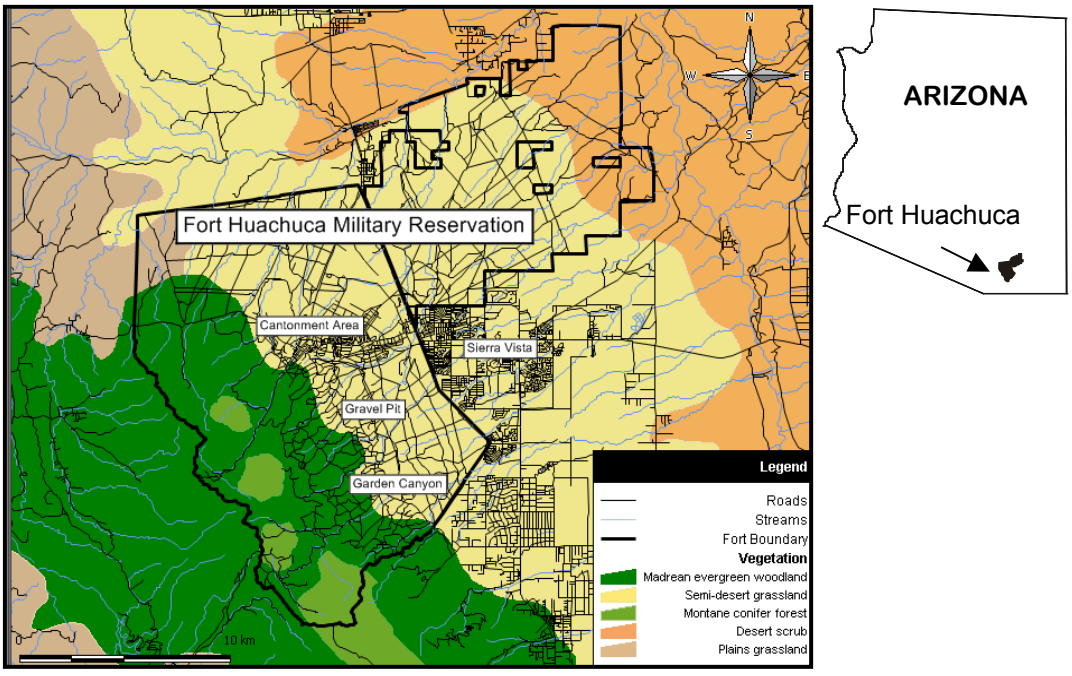
The initial objectives of the study failed due to extremely low rates of capture in the control and comparison areas (see Results). The objectives were then modified to focus on the effects of translocation, by capturing, vaccinating, radiocollaring and translocating skunks from the cantonment area to an area with a population of radiocollared skunks. Translocated skunks were monitored for 2-3 months to measure mortality rates, movement patterns, and spatial effects on the resident population. Movements of radiocollared skunks within the cantonment area, captured as part of another study (Hass, in prep), and transplanted animals that returned to the housing area, were used to identify buildings and structures for potential modification to order to reduce shelter for skunks and other nuisance wildlife.

Methods

Study Sites

The study site was the Fort Huachuca Military Reservation, in southeastern Arizona (Fig.1). The military reservation is located about 120 km SE of Tucson, and encompasses 491 km^2 of Chihuahuan desert scrub, plains and desert grassland, encinal and pine-oak woodland, and montane conifer forest (Brown, Lowe, and Pase, 1979). Approximately 22 km^2 are considered improved, consisting of lawns, athletic fields, golf course, cemeteries, etc. (Gabel, 1995). The City of Sierra Vista lies outside the main gate of the Fort, with a rapidly growing population of more than 40,000 people.

Figure 1. Location of the study site, with major trapping and transplant areas shown.



Trapping was conducted in the 14.5 km^2 housing area and a similar habitat about 3 km away (Gravel Pit; Fig. 1). While not serving necessarily as a control (another urban area would be necessary for that) the second trapping site was to determine if changes in density were due to climatic or disease-related factors that were affecting the overall skunk populations.

During this study, I simultaneously conducted a study of the ecology of hooded and striped skunks in lower Garden Canyon (Hass, in prep.). This area was mainly mixed grassland-oak savannah, but integrated into oak-juniper woodland at the mouth of the canyon and on some north-facing slopes. The creek bed was bordered by riparian vegetation (*Populus, Platanus, Fraxinus, Juglans, Acer*).

Densities

Measurement of skunk densities was attempted using a trapping web with distance sampling methodology (Anderson et al., 1983). The methodology proposed by Anderson et al. (1983) suggests modifying the size of the web to include 8-12 traps within an area the size of a typical home range in the center of the web. Using estimates of home ranges published for striped skunks of about 0.25-2.8 km^2 (Greenwood et al., 1985; Greenwood et al., 1997; Tardona and Bixler, 1995), trapping webs were established with the following parameters: the web had 8 arms, each radiating 965 m from the center. Each arm had 5 traps, spaced at approximate intervals of 125m, 335m, 545m, 755m, and 965m. No traps were placed at the center of the web. Traps were run for 4 nights (160 trap-nights). Traps consisted of Tomahawk model 204 and 207 collapsible traps. In the cantonment area, wooden box traps, measuring appx. 76 x 23 x 30 cm, were used. Coordinates for trap placement were calculated using a computer program. Exact trap placement was adjusted to better site the traps relative to animal pathways, and to shelter the traps from sun and precipitation.

Trapping for density estimates occurred from 5-8 April 2001 at the Gravel Pit site and from 17-20 April 2001 in the cantonment area. Captured animals were anesthetized (under supervision of veterinarian at Fort Huachuca), measured, marked with eartags, and released at the site of capture. Care was taken to make sure animals were not stressed during handling (American Society of Mammalogists, 1998).

Additional trapping records were acquired from the Pest Management Office and Fort Huachuca Veterinary Clinic. A crude density estimate was calculated by dividing the total number of skunks caught each year by the total area of all captures, plus a 500 m buffer.

Translocations

Trapping for the translocation study was conducted from 8-30 April 2002 (excluding weekends). This time period was chosen because it was believed that most, if not all, female hooded and striped skunks would be pregnant. If translocations were successful, this would result in litters born in a non-urbanized environment, hopefully reducing the chance they would move into the cantonment area.

All skunks were captured in wooden box traps used by the nuisance trappers on Post. Trappers set traps in areas where substantial captures have occurred in the past, to maximize trap success. 10-16 traps were open each night, for about 156 trap-nights. Captured animals were anesthetized with a 5:1 or 10:1 mixture of ketamine hydrochloride and xylaxine hydrochoride, measured, vaccinated with rabies vaccine (IMRAB 3; Merial Limited, Iselin, New Jersey), marked with a unique numbering sequence of eartags (to separate from non-vaccinated skunks), radiocollared, and microchipped. Radiocollars (MI-2AM, 35 g, Holohil System, Ltd., Ontario, Canada) were equipped with activity and mortality sensors.

Skunks were transported to Garden Canyon, roughly 8.5 straight-line km from the cantonment area. All skunks were released at the same location. Translocated skunks were monitored daily for the first 2 weeks after release, thereafter they were monitored approximately every other day until they died, the signal was lost, or 30 June 2002. Special attention was paid to female skunks, to determine when and where they gave birth.

The impacts of translocated skunks on resident skunks were examined in two ways: first, by comparing denning locations before the transplant (January-March) and after the transplant (April-June). Second, by comparing survival rates of resident skunks before and after the transplant.

Resident skunks were tracked to their dens at least once per week. Location was recorded using a Garmin 12XL GPS. Den locations pre- and post-transplant were compared using a multi-response permutation procedure (MRPP; Berry and Mielke, 1992; Slauson et al., 1994). This procedure allows analysis of bivariate data, such as x- and y-coordinates, and makes no assumptions about underlying distributions (Biondini et al., 1988; Mielke, 1991).

Survival rates were calculated as a function of time monitored, i.e., number of deaths per animal-day (Hass and Valenzuela, 2002). For each animal, duration of monitoring was recorded from the first date animals were radiocollared or 1 January if marked before the end of 2001. Surviving animals were censored on the last date a signal was received from the transmitter or 30 June 2002 if known to still be alive then (Hass and Valenzuela, 2002).

Daily survival rate (DSR) was calculated as:

DSR_i = (skunk-days$_i$ – total deaths)/skunk-days$_i$,

Where $_I$ refers to the interval being considered (Heisey and Fuller, 1985). Interval (pre- or post-transplant) survival rates (ISR) were calculated as:

$$ISR_i = DSR_i^{Li}$$

Where L_i is the length of the interval. Asymmetric 95% confidence intervals were calculated as:

$$\ln ISR \pm z_{\alpha/2} ISR^{-1} SE\,(ISR)$$

Where *ISR* is the estimated rate, $z_{\alpha/2}$ is the appropriate standard normal value, and *SE* (*ISR*) is the standard error of the rate calculated using the Taylor series approximation (Heisey and Fuller 1985). Daily and interval survival rates and confidence intervals were calculated using MICROMORT (Heisey and Fuller, 1985).

Species and sex composition

The species, sex, and relative age (young-of-the-year, prime, old; based on Godin (1982)) were assessed for each animal handled. In addition, veterinarians and technicians at the Post Veterinary Clinic were asked to fill out a data sheet for each skunk handled, beginning in 1997 (Appendix 1). The data sheet included illustrations to aid in species identification, and measurements for total length and tail length. These measurements are useful in distinguishing hooded from striped skunks (Hoffmeister, 1986).

Health Assessment

All animals handled were examined for overall condition, external parasite load, and quantity and condition of fresh injuries and scars. Exposure to rabies virus was determined by collecting 0.5-1.5 cc of blood from anesthetized skunks, and analyzing blood samples for rabies virus-neutralizing antibodies (VNA). Blood samples were collected into Vacutainers® with EDTA and placed on ice. Following centrifugation, plasma was frozen, and later shipped to the Centers for Disease Control in Atlanta to testing. Tests were done using the rapid fluorescent focus inhibition test (RFFIT; Smith et al., 1996). Freshly dead skunks were frozen and transported to the Museum of Southwestern Biology at the University of New Mexico for necropsy.

Educational Efforts

A brochure was prepared for distribution to the residents of the housing area, informing them about local wildlife, and advising them of ways to reduce wildlife-human conflicts (Appendix 2). Special emphasis was made on the importance of reducing attractants, such as pet food, water, and garbage. These materials will be presented during mandatory newcomer and residential housing briefings.

Use of Structures by Skunks

One hooded skunk, radiocollared as part of another study (Hass, in prep), was located frequently in the cantonment area. The locations of her dens, as well as those of translocated skunks that returned to the housing area, were used to identify the types of structures that

skunks used for daytime shelter and rearing young, and identify specific structures that could be modified to limit access to skunks and other nuisance wildlife.

Results

Densities

Trapping at the lower Gravel Pit site for 160 trap-nights in April 2001 yielded no skunk captures. The same trap effort in the cantonment area yielded one skunk, an adult male striped skunk. Captures at either site were insufficient to calculate densities, and insufficient to determine if structural modifications could be effective at reducing skunk densities.

During 1991 to 2001, trappers captured 280 nuisance skunks in the cantonment area (mean ± SD = 25 ± 9.1/year; Fig. 2). The area encompassed by the trap captures plus a 500 m buffer was 6.32 km^2 (Fig. 3), yielding annual density estimates of 2.2-6.3 skunks/km^2. Most skunks were captured along a strip of houses that borders the urban-wildland interface (Fig. 3).

Figure 2. Number of skunks captured and euthanized or translocated from 1991-March 2002 at Fort Huachuca Military Reservation, along with the number testing positive for rabies.

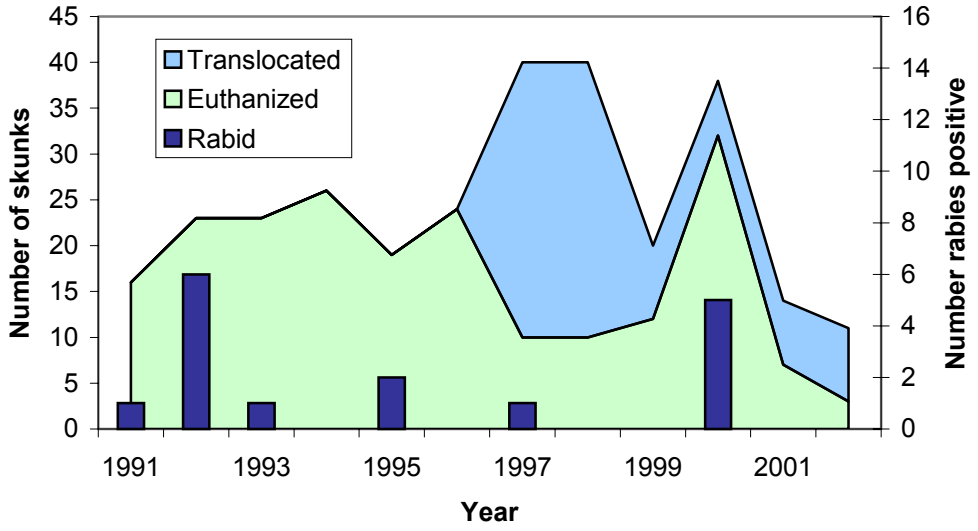
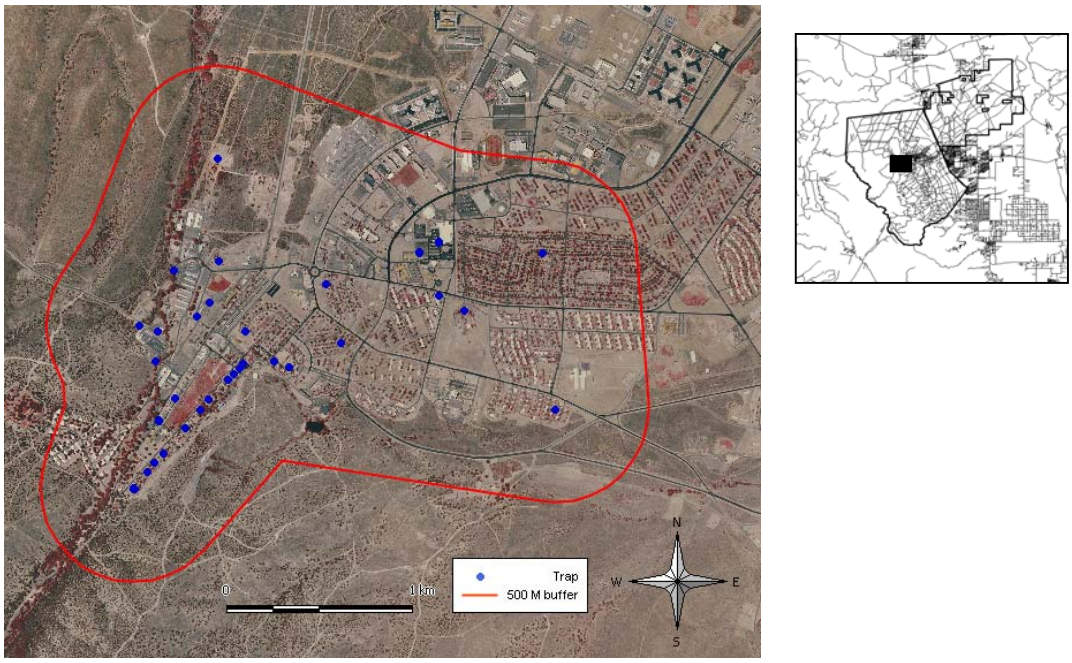


Figure 3. Locations of traps set by nuisance trappers from 1999-2001, within the cantonment area of Fort Huachuca. Background is a USGS digital orthophoto taken in 1996. Black rectangle in small diagram indicates location of photo.



Translocations

Ten skunks were captured in the cantonment area during 156 trap-nights in April 2002. One animal died during handling, so 9 skunks were translocated to lower Garden Canyon. This included 3 hooded and 6 striped skunks. Their movements are depicted in Fig. 4, and fates summarized in Table 1 and below.

M601. Adult male hooded skunk was released on 9 April 2002. He remained in the release area for one night, and then traveled back to the cantonment area the next night. He was tracked within the cantonment area until he was captured in a trap set for nuisance rock squirrels on 30 May 2002. He died of heat exposure in the trap, which was set on a blacktop parking area, while personnel from the Pest Management Office and Wildlife Section tried to figure out how to remove him without being sprayed (K. Bartlein, Fort Huachuca Wildlife Section, pers. comm.). Necropsy at the University of New Mexico revealed a healthy animal, although his lung tissue was positive for infection by lungworms (J. Dragoo, pers. comm.).

F602. Adult female striped skunk was released on 9 April 2002. She moved north of the release site, and was repeatedly located on Woodcutter's ridge and near the Gravel Pit Ponds. Her signal disappeared on 24 April, and she was lost to monitoring until 25 June, when she was captured in a trap set at the Fort Huachuca Golf Course. She was transported to the Post Veterinary Clinic, where she was held for 24 hours then released on site. She remained in the cantonment area, and was found denning under buildings until 30 June 2002. It is not known if she had a litter or not, but she had none when observed in the cantonment area in late June.

F603. Juvenile female striped skunk was released on 9 April 2002. She stayed within 1 km of the release site, but was lost to monitoring on 13 April when she shed her collar 1.5 km SE of the release site.

F604. Adult female striped skunk was released on 10 April 2002. She immediately began moving SE of the release site, and was located in Brown Canyon on 11 and 12 April, and had moved to the south side of Ramsey Canyon by 16 April. She was subsequently located near Highway 92 and Yaqui Drive, in a neighborhood on the south side of Sierra Vista. The signal from her transmitter was extremely difficult to pick up, and she was lost to monitoring 1 week later.

F605. Adult female striped skunk was released on 11 April 2002. She immediately began moving north from the release site, and was back in the cantonment area by 15 April 2002. She was tracked in the cantonment area until early June. She then moved into Heritage Park, an undeveloped riparian area, the first week of June, and based on her movement patterns, gave birth there.

M606. Adult male hooded skunk was released on 17 April 2002. He remained within 1.5 km of the release site until early June. On 5 June, his transmitter began emitting a mortality signal, and a thorough search of the area revealed the signal was emanating from an aerie on a sheer cliff near the top of a peak. It is assumed that he was killed by a raptor; the aerie may be the nest of a Great Horned Owl, *Bubo virginianus* (N. Snyder, pers. comm. to Sheridan Stone).

F607. Adult female striped skunk was released on 17 April 2002. She remained in lower Garden Canyon until the end of April, and was then located near Gravel Pit pond. Her transmitter began emitting a mortality signal on 3 May. When her carcass was recovered that day, it was discovered that she managed to get the radio package wedged between her jaws. Necropsy revealed that she was healthy, had abundant body fat, and was pregnant with 5 embryos.

F526. Adult female hooded skunk was released on 26 April 2002. She was originally captured near the cantonment area in May 2001, and tracked within the cantonment area until late April. She remained within 1 km of the release site, and based on movements, gave birth in early June. She was still in the area on 30 June, and on 12 July, was photographed moving a youngster from one den to another (Fig. 5).

Figure 4. Locations of transplanted skunks from point of release until 30 June 2002. Colors of dots indicate different individuals. Lines have been added to illustrate to movements of some animals.

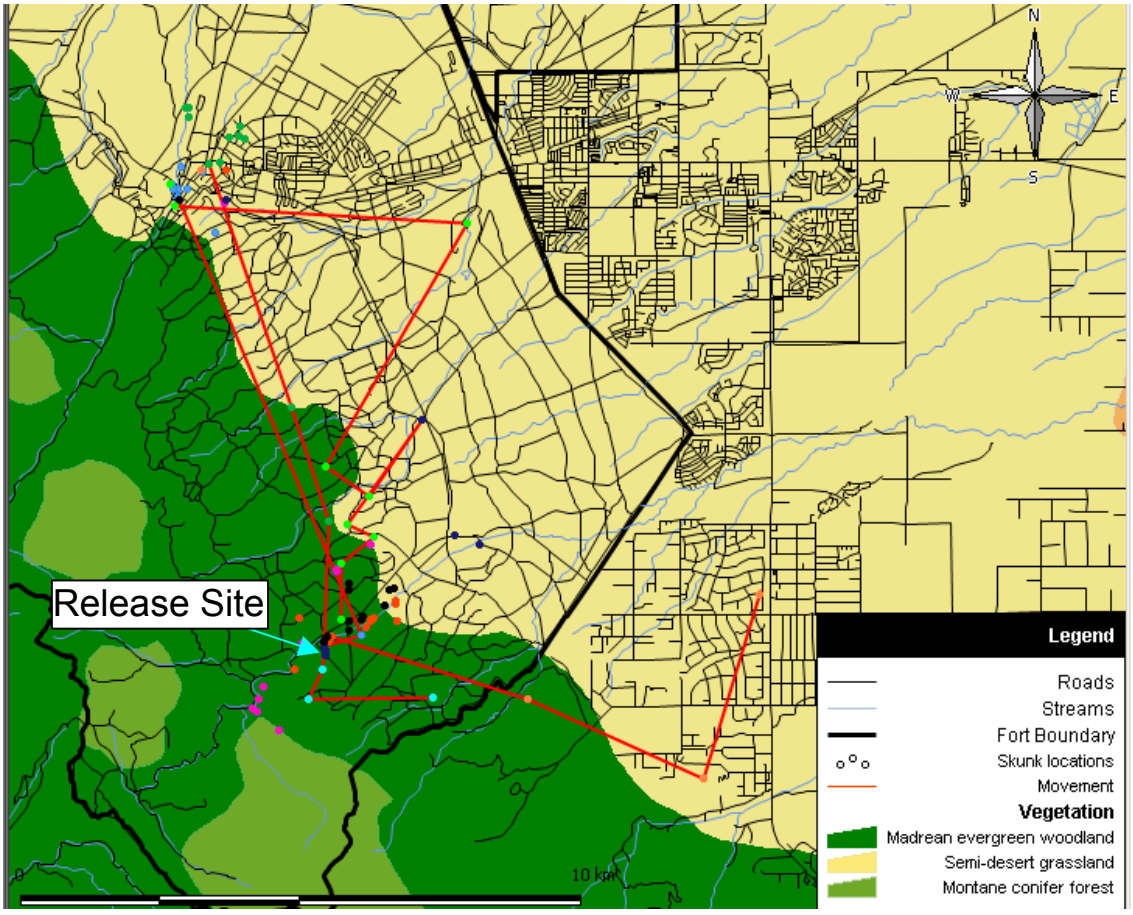


Figure 5. Hooded skunk F526 moving a youngster from one den to another on 12 July 2002. This skunk was translocated from the cantonment area to lower Garden Canyon on 26 April and gave birth in Garden Canyon in early June. Her picture was captured with a remote infrared camera.

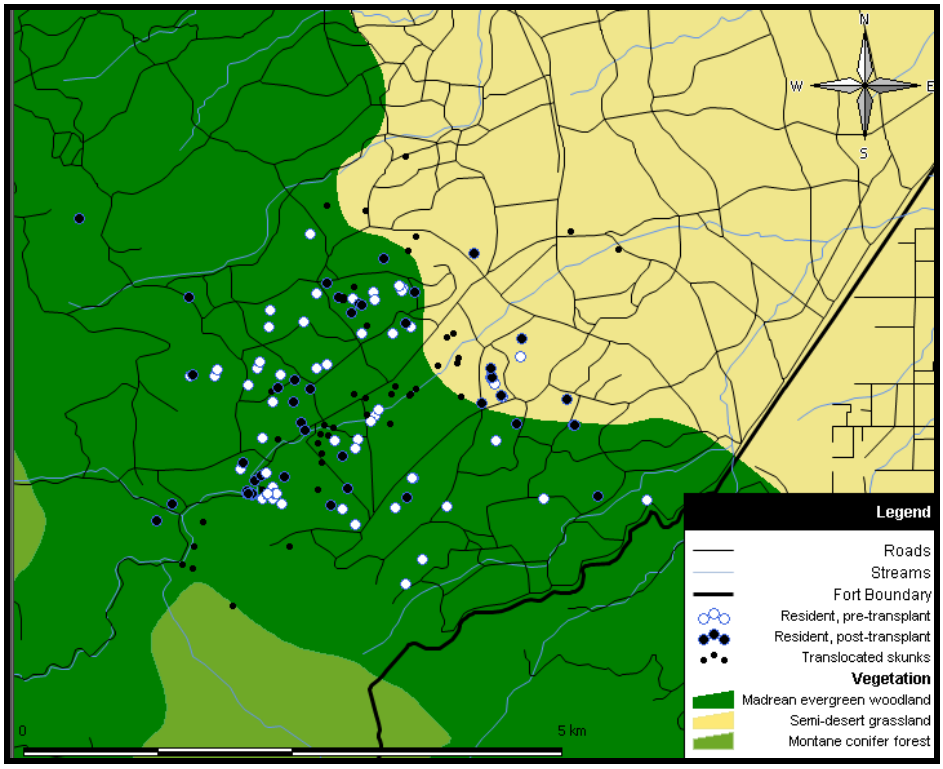
F609. Adult female striped skunk was released on 30 April 2002. She remained within 1.5 km of the release site, and based on movements, gave birth in early June. She was still in lower Garden Canyon on 30 June.

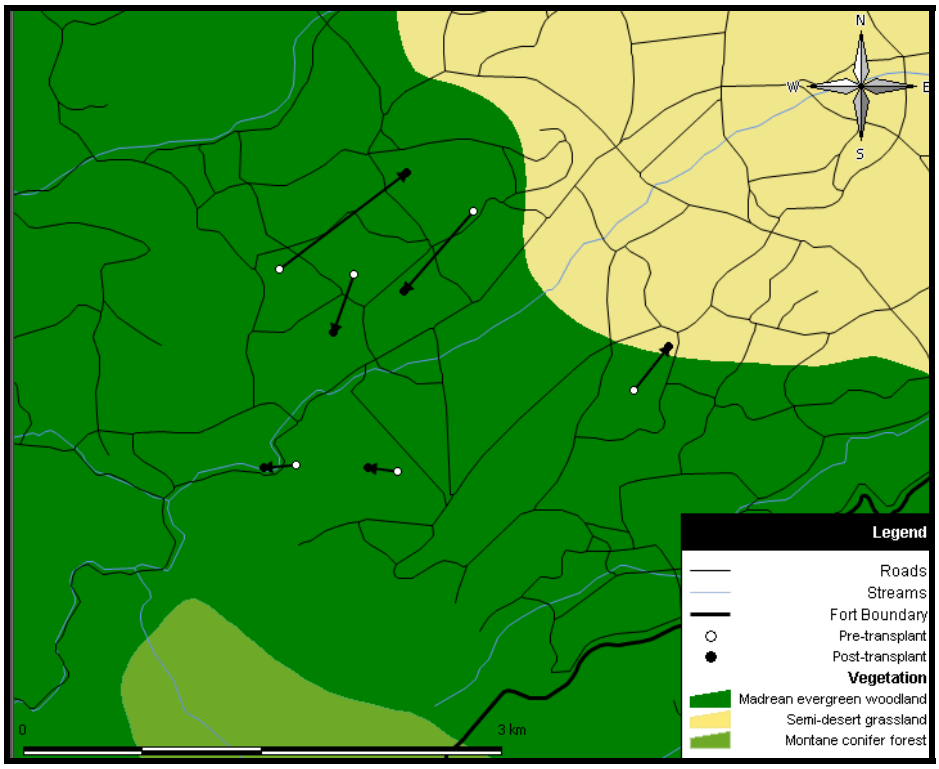
Table 1. Fates of 9 skunks translocated from the cantonment area to lower Garden Canyon, Fort Huachuca during April 2002. Fates are as of 30 June 2002.

Identification Number	Species	Sex	Date Released	Fate
M601	Hooded	Male	9 April 2002	Died.
F602	Striped	Female	9 April 2002	Returned to cantonment area.
F603	Striped	Female	9 April 2002	Dropped collar.
F604	Striped	Female	10 April 2002	Moved into Sierra Vista.
F605	Striped	Female	11 April 2002	Returned to cantonment area.
M606	Hooded	Male	17 April 2002	Died.
F607	Striped	Female	17 April 2002	Died.
F526	Hooded	Female	26 April 2002	Remained in release area.
F609	Striped	Female	30 April 2002	Remained in release area.

One male striped skunk and 5 male hooded skunks were monitored for sufficient time during both the pre-and post-transplant periods to assess changes in denning locations. Of these, 3 made significant shifts in location post-transplant, and 3 did not (MRPP, $P < 0.05$; Fig. 6). Four of the 6 skunks shifted their median locations to the east, in the direction of more permanent water.

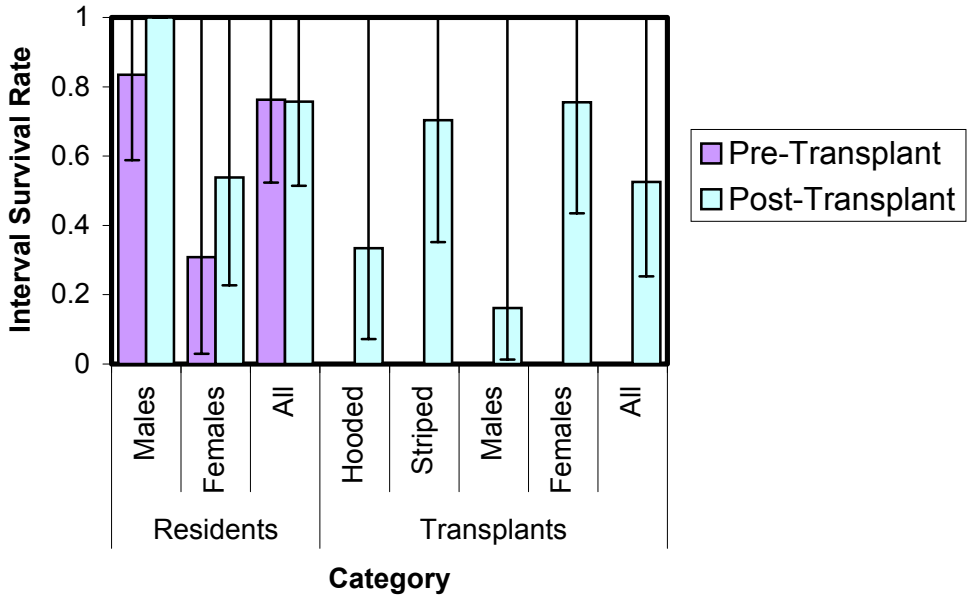
Figure 6. Top, locations of 6 male resident skunks pre- and post transplant, along with locations of transplanted skunks. Only skunks residing in lower Garden Canyon are shown. Bottom, Shifts in median locations for 6 resident skunks, pre- and post-transplant.





Survival rates of resident skunks did not differ between periods (Fig. 7). Survival of both male and females increased between periods, from 0.83 to 1.0 for males, and 0.31 to 0.54 for females, while remaining at 0.76 overall. Survival rates of residents were somewhat higher than those of transplants, combining sexes, species, and mortality agents, at 0.53 (Fig. 7).

Figure 7. Survival rates, pre- and post-transplant, for resident and transplanted skunks at Fort Huachuca, Arizona. The pre-transplant period was from 1 January-30 March 2002, and included 1 male striped skunk, 3 female hooded skunks, and 6 male hooded skunks. The post-transplant period was from 1 April-30 June 2002, and included 1 male striped skunk, 4 female hooded skunks, and 6 male hooded skunks among the residents, and 1 female hooded, 2 male hooded, and 6 female striped skunks among the transplants. Columns are interval-specific survival rates, narrow bars are 95% confidence intervals.



Species and sex composition

Captures for density estimates and translocations in the cantonment area included 1 male and 7 female striped skunks, and 2 male and 1 female hooded skunks (73% striped; 27% hooded). All were adults except for 2 female striped skunks, which were < 1 kg, had little or no tooth wear, and showed no evidence of having nursed a litter; indications that they were < 1 year old (Godin, 1982).

Nuisance trapping records seldom recorded species or sex of captured skunks. Data sheets returned from the Fort Huachuca Veterinary Clinic included 3 male hog-nosed skunks, 3 male and 2 female hooded skunks, and 5 male and 3 female striped skunks. No spotted skunks were identified on the data sheets. Of the 16 skunks, 19% were hog-nosed, 31% were hooded, and 50% were striped skunks. Twelve of the data sheets were filled out for skunks captured during October 1998. Of those, 9 (75%) were identified as juveniles.

Health assessment

With the exception of the female striped skunk that died during handling, all skunks appeared healthy and had negligible external parasites. The female that died was not captured in a trap, but was brought in by Military Police who found it sitting quietly in a ditch. According to the officers, she was rather lethargic when approached, but sprayed them when they captured her. She expired following injection of ketamine and xylazine. She was thin, but appeared uninjured. Her head was submitted to the state lab for rabies testing, and it came back negative. No other necropsy was performed.

Blood samples were taken from 8 of the 10 skunks captured in the cantonment area during April 2002. All were negative for rabies VNA (C. Rupprecht, in litt.).

Educational efforts

A brochure was prepared for distribution to the residents of the Post housing area (Appendix 2). When approached by the public, I took the opportunity to answer questions about skunks, rabies, and reducing problems with skunks. The most common misconceptions were that all skunks were rabid, and that skunks would chase you down to spray you.

Use of structures by skunks

Radioed skunks F526, M601, F602, and F605 were tracked in the cantonment area to determine which buildings were most commonly used by skunks for daytime resting areas or raising their young (Table 2). Hooded skunk F526 was tracked in and near the cantonment area from May 2001 to April 2002. She gave birth under a cement slab outside of the cantonment area in June 2001, but moved her youngsters under building 22422 (Directorate of Installation Support) when they were about 7 weeks old. They remained there for about 2 weeks, then the family moved into a storage shed, building 61804. The 4 youngsters were independent a couple of weeks later. The youngsters were not marked, and their fates are unknown. F526 remained in the cantonment area until she was translocated to Garden Canyon in April 2002.

Hooded skunk M601 was translocated to Garden Canyon, but quickly returned. He was usually located under the same buildings used by F526, but not at the same time.

Striped skunk F602 was translocated to Garden Canyon, and eventually moved north to the Golf Course. She was moved to the cantonment area in late June, and released there. She was difficult to locate in the cantonment area, apparently finding refuge in one or more spots from which transmitter signals did not propagate well.

Striped skunk F605 returned to the cantonment area within a week of her release in Garden Canyon. She was often located in storm drains, and only appeared to use a few buildings near the traffic circle. She gave birth in Heritage Park, an undeveloped riparian area near the edge of the cantonment area, and remained there through 30 June 2002.

Most of the buildings used by skunks for daytime resting areas were located in the older section of Post, where many buildings are elevated above the ground on at least one side (Table 2; Figs. 8). There is also an extensive underground drain system that runs near or under buildings in this area; skunks were frequently located in this drainage system. Skunks were also located under metal storage containers and piles of pallets, and within large piles of leaves that collected in corners of buildings.

Table 2. Frequency of building use in the cantonment area of Fort Huachuca by individual skunks, May 2001-June2002. Skunks were located by telemetry, and usually found in storm drains, crawl space under buildings, or in or under sheds.

	Skunk identification numbers				
Building No.	**F526**	**M601**	**F602**	**F605**	**Total**
21114	1				1
22208	1		1		2
22216	1				1
22320	1				1
22326		1			1
22328	1	1			2
22408	7	4			11
22410	1				1
22422	8	5			13
22526	1				1
22536	1				1
22541	4		1		5
30018	5				5
30025	1				1
30026	6	2			8
41418		1			1
41419	1		1		2
41421			1	2	3
51301				2	2
51414				1	1
61804	4				4

Figure 8. Examples of buildings and structures used by skunks and raccoons on Fort Huachuca. Clockwise from top left: Abandoned mule barns with abundant crevices and lack of human activity were a common denning area. Old barracks mostly sealed off with latticework, but leaving sections open, provided nice sheltered areas for skunks and raccoons. Drainage culvert under roads and buildings were common skunk daytime rests. An old barracks now used for office space, most of the building is sealed off below with a rock pseudo-foundation, however the open lattice work on the front of the building still permits entry to wildlife; even minor gaps in latticework allow skunks to move through; one was observed crawling through the holes on the bottom left on several occasions; one hole in the door of an otherwise sealed building permitted access to skunks,.

Discussion

Initial trapping estimates, using a trapping web, failed to capture enough skunks to obtain density estimates. Anderson et al. (1983) recommended > 60 initial captures for robust density estimates. It is unknown whether the low number of captures was due to trap placement or low skunk numbers. The latter cannot be ruled out, as the comparison area at lower Gravel Pit had no captures and nuisance trappers also caught few skunks during that period. Density estimation using trapping web methodology will be more thoroughly discussed in "Ecology of hooded and striped skunks (*Mephitis* spp.) in southeastern Arizona" (Hass, in prep).

The crude density estimate from the number of nuisance skunks captured by pest management trappers each year (2.2-6.3/km^2) were comparable to density estimates from metropolitan Toronto, Ontario (2.6-5.6/km^2; Rosatte et al., 1991) but higher than estimates from rural Alberta (0.7-1.2/km^2; Bjorge et al., 1981). The density estimate obtained here should be used cautiously, however, as trapping was done in response to calls to the Pest Management Office, and may reflect effort based on public perception of skunk problems. In addition, many skunks were captured on the edges of the cantonment area, and may include skunks from outside the cantonment area that were attracted by the bait in the traps. No reliable method of estimating skunk density has been found; mark-recapture tends to underestimate density (Greenwood et al., 1985), whereas road spotlighting surveys are extremely variable in their results (Cervantes et al., 2002).

Although hooded skunks are generally considered less apt to use human habitation than striped skunks (Hoffmeister, 1986), a substantial number of hooded skunks were identified among captures for the translocation experiment as well as skunks euthanized by the Fort Huachuca Veterinary Clinic. In addition, 2 hooded skunks were radiotracked to numerous daytime retreats under buildings in the cantonment area. Hooded skunks may be more common in urbanized areas than previously thought, and their numbers underreported due to the difficulty in distinguishing them from striped skunks.

The success of the translocation program could be looked at in different ways. On one hand, the effort successfully removed 46 skunk and potential skunks (females with litters). The effect of translocation on resident skunks appeared negligible. On the other hand, at the end of the study, only 2 skunks remained in the release area, 1 had moved into Sierra Vista, 3 were dead, and 3 had moved back into the cantonment area (including 1 with a litter).

The probability that an animal will return following translocation depends on the distance to the release site (Conover, 2002). In general, this distance is 5 to 10 times the width of an animal's home range (Conover, 2002). For skunks at Fort Huachuca, this means moving them a minimum distance of 10 km, which limits release sites to Garden and Blacktail Canyons, excluding the east range, which is marginal habitat (pers. obs.). Both of these sites

are barely 10 km away and near the Fort's boundaries, meaning dispersing skunks may leave the Fort and cause problems elsewhere.

Intensive population reduction efforts were successful in limiting the spread of rabies in Alberta (Pybus, 1988; Rosatte et al., 1986). However, population reduction of carnivores generally is considered inadvisable as a method of reducing the prevalence of rabies (Krebs et al., 1999; Rupprecht et al., 1995). Live-trapping within the cantonment area appears to have had little impact on either skunk numbers or rabies prevalence.

Translocation of carnivores, in particular skunks, raccoons, and foxes, is widely discouraged (Conover, 2002; Craven et al., 1998; National Association of State Public Health Veterinarians, 2001). The risks of disease transmission by these rabies reservoirs are well documented (Conover, 2002; Rosatte and Macinnes, 1989; Rupprecht et al, 1995). For example, raccoons translocated from Georgia to West Virginia during the mid-1970s started a rabies epidemic that now stretches from Florida to Ontario (Krebs et al., 2000). Funds expended by APHIS Wildlife Services to reduce the epidemic now exceed $1.5 million annually (APHIS, 2001). Translocation of striped skunks from Mississippi to Ontario resulted in an outbreak of rabies (Rosatte and MacInnes, 1989). In addition to the economic costs, translocated animals tend to have high mortality rates, often return to their capture sites or cause similar problems elsewhere, increase competition for resident animals, may impact reproduction and genetics of resident populations, and is seldom cost-effective (Conover, 2002; Craven et al., 1998). Also, the agency responsible for transplanting an animal may be held liable for damage or injury caused by that animal after translocation (Conover, 2002).

The primary benefit of translocations of nuisance wildlife lies in public relations. In general, the public perceives that they are giving wildlife a second chance and that once in their new home they will "live happily ever after" (Conover, 2002; Craven et al., 1998). The decision to stop euthanizing all nuisance skunks at Fort Huachuca and start translocating was made in response to public concerns (E. Gabel, in litt.). However, the public is seldom aware of the stress placed on animals by trapping and relocating, the higher mortality rates associated with translocation, or the risks of disease transfer (Conover, 2002). According to Conover (2002: 224):

"State wildlife agencies should consider requiring nuisance animals to be euthanized upon capture, rather than allowing them to be translocated. Wildlife agencies should also then require all NWCO's[1] to inform their clients that the captured animals will be humanely euthanized. This way, clients will realize that one of the costs of removing the nuisance animal will be its death. Then they can make their own decision whether the problem they are experiencing is worth that cost."

[1] Nuisance Wildlife Control Officer's

Currently at Fort Huachuca, no efforts at education or structural modification to exclude nuisance wildlife are provided in response to calls to the Pest Management Office. It may be more cost-effective to reduce the attractiveness of the cantonment area to skunks and raccoons, than to spend thousands of dollars each year translocating them. Educational efforts, including the brochure accompanying this report, should be provided to anyone requesting action related to nuisance wildlife. These efforts should be directed at reducing food attractants, such as garbage. Buildings that currently provide shelter to skunks and raccoons should be modified to exclude these animals. Although many of these buildings are listed in the National Historic Register, most, if not all, already have in place some excluding structures, such as rock wall foundations or wood latticework. Latticework can be modified to exclude smaller skunks, squirrels and mice by attaching ¼-inch hardware cloth to the inside.

Vaccination of skunks against rabies may be more effective at reducing the potential for human exposure than translocation (Rupprecht et al., 1995). Parenteral vaccination is very effective in striped skunks (Rosatte et al., 1992; Rupprecht et al. 1995). Currently available oral vaccines for foxes, raccoons, and coyotes do not appear effective in striped skunks (Rosatte et al., 1992), but new oral vaccines are under development (Hanlon et al., 2002; Vos et al., 2002). If public education can reduce fear of healthy skunks, and structural modifications can limit areas available for denning, vaccinating and releasing skunks on site may limit the need for transplant or euthanization while reducing the threat from rabid skunks. However, it is possible that this may result in unacceptably high numbers of skunks in the cantonment area, and may not be the only solution.

Management Recommendations

1. Develop a formal management plan for nuisance wildlife on Post with one or more explicit long-term goals. This plan should be developed in cooperation with the Fort Huachuca Wildlife Section, Fort Huachuca Pest Management Office, Fort Huachuca Veterinary Clinic, Fort Huachuca Garrison Commander, Sierra Vista Animal Control, Cochise and Santa Cruz County Animal Control, Arizona Game & Fish Department, and Arizona Department of Health Services.

2. Every call requesting action related to nuisance wildlife on Fort Huachuca should include 2 components before any trapping occurs:

   Education. Callers should be provided information on the species of concern, why its there, what will happen to the trapped animal, and potential benefits of leaving the animal in place. For example, skunks residing under buildings may be consuming less desirable mice and cockroaches.

Site examination. The location where the nuisance wildlife was reported should be examined and a plan developed to exclude nuisance wildlife.

3. Trapping and application of excluding devices or structures should take into consideration the biology of the animal. Trapping or excluding skunks and raccoons should **NOT** occur between 15 May and 30 August, after females have given birth but before young are weaned.

4. All resident domestic dogs, cats, and ferrets should be vaccinated against rabies.

5. Intentional feeding of wildlife in the cantonment area and adjacent picnic areas should be forbidden.

6. Ecologically, the best alternative for captured skunks is euthanasia.

7. If euthanization of all skunks is not acceptable, a trap-vaccinate-release program should be considered.

8. If translocation remains the preferred option for population reduction, the following guidelines should be considered:

    a. Vaccination should be mandatory for **ALL** translocated skunks, raccoons, and foxes.

    b. Skunks should be released in the savannahs at the mouths of Blacktail (preferred) or Garden Canyons, at least 1 km from any developed site (including picnic sites and developed training areas), <u>following</u> vaccination. Blacktail Canyon is preferred because it is farther from any developed or urbanized areas. Black Tower should also be considered as a release site.

    c. Raccoons should be released near the mouths of the same canyons near available water, <u>following</u> vaccination.

    d. Foxes should be released on site, <u>following</u> vaccination.

    e. Opossums should be released 1-2 km up Huachuca Canyon. Opossums appear to be minor vectors of rabies, and vaccination is probably not necessary.

8. Trapping skunks for the purposes of population reduction should focus on periods when the females are pregnant (April-early May) and when juveniles are dispersing (October-December).

9. If there is any chance that a structure is currently occupied by animals, one-way doors should be built into the excluding structures.

10. Further studies of movements and reproduction of skunks in the cantonment area should be considered to examine the efficacy of education and structural modification versus translocation.

Conclusions

Reducing skunk densities in the cantonment area of Fort Huachuca is a complex issue. Past efforts have included euthanizing and translocating nuisance skunks, but have done little to reduce skunk numbers or the threat of rabies exposure. Translocating pregnant skunks in this study reduced the number of litters potentially raised in the cantonment area, and appeared to have negligible effects on the resident population. However, the risks of transmission of rabies from the cantonment area to other areas, including Sierra Vista, are extremely high. Translocation should only be used as a last resort, and any translocated skunks should be vaccinated. Because the cantonment area is surrounded by wild lands, and due to the extensive underground storm drains, eradicating skunks and other nuisance wildlife is not possible.

Literature Cited

American Society of Mammalogists. 1998. Guidelines for the capture, handling, and care of mammals as approved by the American Society of Mammalogists. Journal of Mammalogy, 79:1416-1431.

Anderson, D. R., K. P. Burnham, G. C. White, and D. L. Otis. 1983. Density estimation of small-mammal populations using a trapping web and distance sampling methods. Ecology, 64:674-680.

APHIS. 2001. Wildlife rabies control business plan. USDA/APHIS, Wildlife Services Rabies Management Team. Draft, December 2001.

Aranda, M. and L. Lopez-de Buen. 1999. Rabies in skunks from Mexico. Journal of Wildlife Diseases, 35:574-577.

Berry, K.J. and P.W. Mielke, Jr. 1992. A family of multivariate measures of association for nominal independent variables. Education and Psychological Measurement, 52:41-55.

Biondini, M.E. and P.W. Mielke, Jr, and K.J. Berry. 1988. Data-dependent permutation techniques for the analysis of ecological data. Vegatio, 75:161-168.

Bixler, A. 1997. The striped skunk: factors affecting a solitary social system. Ph.D. Dissertation, University of Tennessee, Knoxville, 142 pp.

Bjorge, R.R., J.R. Gunson, and W.M. Samuel. 1981. Population characteristics and movements of striped skunks (*Mephitis mephitis*) in central Alberta. Canadian Field-Naturalist, 95:149-155.

Brown, D.E., C.H. Lowe, and C.P. Pase. 1979. A digitized classification system for the biotic communities of North America, with community (series) and association examples for the southwest. Journal of the Arizona-Nevada Academy of Science, 14:1-16.

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Laake. 1993. Distance sampling: estimating abundance of biological populations. Chapman & Hall, London.

California Center for Wildlife. 1994. Living with wildlife. Sierra Club Books, San Francisco.

Cervantes, F.A., J. Loredo, and J. Vargas. 2002. Abundance estimates of sympatric skunks (Mustelidae: Carnivora) in Oaxaca, Mexico. Journal of Tropical Ecology, 18:463-469.

Conover, M. 2002. Resolving human-wildlife conflict. The science of wildlife damage management. CRC Press, Boca Raton, Florida.

Craven, S., T. Barnes, G. Kania. 1998. Toward a professional position on the translocation of problem wildlife. Wildlife Society Bulletin, 26:171-177.

Gabel, E. 1995. Installation Pest Management Plan. Fort Huachuca, Arizona. U.S. Army Garrison, Fort Huachuca, Arizona.

Godin, A. J. 1982. Striped and hooded skunks. Pp. 674-687, *in* Wild mammals of North America. Biology, management, economics (J. A. Chapman and G. A. Feldhamer, eds.). The John Hopkins University Press, Baltimore, 1147 pp.

Greenwood, R.J. W.E. Newton, G.L. Pearson, and G.J. Schamber. 1997. Population and movement characteristics of radio-collared striped skunks in North Dakota during an epizootic of rabies. Journal of Wildlife Diseases, 33:226-241.

Greenwood, R.J., A.B. Sargeant, and D.H. Johnson. 1985. Evaluation of mark-recapture for estimating striped skunk abundance. Journal of Wildlife Management, 49:332-340.

Hanlon, C.E., J.E. Childs, V.F. Nettles, et al. 1999. Recommendations of a national working group on prevention and control of rabies in the United States III: Rabies in wildlife. Journal of the American Veterinary Association, 215:1612-1618.

Hanlon, C.A. , M. Niezgoda, P. Morrill, and C.E. Rupprecht. 2002. Oral efficacy of an attenuated rabies virus vaccine in skunks and raccoons. Journal of Wildlife Diseases, 38:320-427.

Hass, C.C. In Prep. Ecology of hooded and striped skunks (*Mephitis* spp.) in southeastern Arizona. Final report Arizona Game & Fish Dept., Heritage Funds project I20001.

Hass, C.C. and D. Valenzuela. 2002. Antipredator benefits of group living in white-nosed coatis. Behavioral Ecology and Sociobiology, 51:570-578.

Heisey, D. and T. Fuller. 1985. Evaluation of survival and cause-specific mortality rates using telemetry data. Journal of Wildlife Management, 49:668-674.

Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press and the Arizona Department of Game and Fish, Tucson.

Krebs, J.W., M. L. Wilson, and J. E. Childs. 1995. Rabies – epidemiology, prevention and future research. Journal of Mammalogy, 76:681-694.

Krebs, J.W., C.E. Rupprecht, and J.E. Childs. 2000. Rabies surveillance in the United States during 1999. Journal of the American Medical Veterinary Association, 217:1799-1811.

Larivière, S. and F. Messier. 1997. Seasonal and daily activity patterns of striped skunks (*Mephitis mephitis*) in the Canadian prairies. Journal of Zoology, London, 243:255-262.

Larivière, S. and F. Messier. 1998. Denning ecology of the striped skunk in the Canadian prairies: implications for waterfowl nest predation. Journal of Applied Ecology, 35:207-213.

Mielke, P.W. Jr. 1991. The application of multivariate permutation methods based on distance functions in the earth sciences. Earth-Science Reviews, 31:55-71.

National Association of State Public Health Veterinarians. 2001. Compendium of animal rabies prevention and control. Mortality and Morbidity Weekly Report, 50:1-9.

Patton, R.F. 1974. Ecological and behavioral relationships of the skunks of Trans Pecos Texas. Ph.D. dissertation, Texas A&M University.

Pybus, M.J. 1988. Rabies and rabies control in striped skunks (*Mephitis mephitis*) in three prairie regions of western North America. Journal of Wildlife Diseases, 24:434-449.

Rosatte, R.C. and C.D. MacInnes. 1989. Relocation of city raccoons. Proceedings of the Great Plains Wildlife Damage Conference, 9:87-92.

Rosatte, R.C. M.J. Power, and C.D. MacInnes. 1991. Ecology of urban skunks, raccoons, and foxes in metropolitan Toronto. Pp. 31-38 in Wildlife conservation in metropolitan environments. L.W. Adams and D.L. Leedy, eds. National Institute for Urban Wildlife, Columbia, MD.

Rosatte, R.C. M.J. Power, C.D. MacInnes, and J.B. Campbell. 1992. Trap-vaccinate-release and oral vaccination for rabies control in urban skunks, raccoons, and foxes. Journal of Wildlife Diseases, 28:562-571.

Rosatte, R.C., M.J. Pybus, and J.R. Gunson. 1986. Population reduction as a factor in the control of skunk rabies in Alberta. Journal of Wildlife Diseases, 22:459-467.

Rupprecht, C.E., J.S. Smith, M. Fekadu, and J.E. Childs. 1995. The ascension of wildlife rabies: a cause for public health concern or intervention? Emerging Infectious Diseases, 1: 107-114.

Sargeant, A. B., R. J. Greenwood, J. L. Piehl, and W. B. Bicknell. 1982. Recurrence, mortality, and dispersal of prairie striped skunks, *Mephitis mephitis*, and implications to rabies epizootiology. Canadian Field-Naturalist, 96:312-316.

Slauson, W.L., B.S. Cade, and J.D. Richards. 1994. User manual for Blossom statistical software. U.S. Geological Survey, Midcontinental Ecological Science Center, Fort Collins, CO.

Smith, J.S., P.A. Yager, and G. M. Baer. 1996. A rapid fluorescent focus inhibition test (RFFIT) for determining rabies virus-neutralizing antibodies. Pp. 181-192 in Laboratory techniques in rabies, 4th ed. F.-X. Meslin, M M. Kaplan, and H. Koprowski, eds. World Health Organization, Geneva, Switzerland.

Tardona, D. R., and A. Bixler. 1995. Behavioral ecology and management of striped skunks in Great Smoky Mountains National Park. Park Science, 15:22-23.

Vos, A., E. Pommerering, L. Neubert, S. Kachel, and A. Neubert. 2002. Safety studies of the oral vaccine SAD-19 in striped skunks (*Mephitis mephitis*). Journal of Wildlife Diseases, 38:428-431.

Appendix 1. Data sheet given to Post veterinarians to collect data on skunks brought in for euthanasia.

SKUNK DATA FORM

Date _____ **Species** (circle) Striped Hooded Hognose Spotted (compare with drawings below)

Location captured _____ **Sex** _____ **Weight** _____ kg

Total length (tip of nose to tip of tail bone) _____ cm **Tail length** _____ cm

Est. age (circle) Juvenile Prime Old

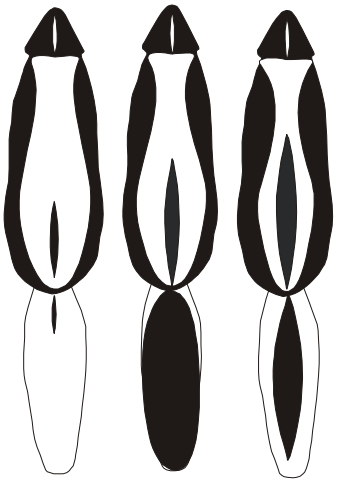
Reproductive Condition: **Males** - is the scrotum obvious? Yes No (do not confuse with scent gland)

Females - obviously pregnant or lactating? (circle if applies)

Submitted for rabies test (circle) Yes No **Result:** Pos Neg

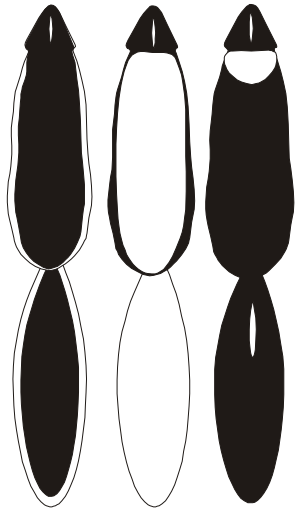
These are the most common patterns in this area, although others are possible.

Striped skunk



-stout body
-tail less than body length
-white stripe on nose
-black stripe on lower back
-adult weight usually > 1 kg

Hooded skunk



-slender body
-tail longer than body
-white stripe on nose
-long hair on sides of neck (hood)
-adult weight usually < 1 kg

Hognose skunk

-stout body
-solid white back
-fat, naked nose
-tail shorter than body
-no white stripe on face
-adult weight usually > 1 kg

Spotted skunk

-very small (< 1 kg)
-large round spot on face

When completed, return forms to FH Wildlife Office, ATZS-ISB, Attn: Sheridan Stone or Jim Hessil.

Appendix 2. Brochure developed to help educate Post residents on how to reduce nuisance wildlife problems in the housing area.

Learn more

For information on the wildlife of Fort Huachuca, contact the Fort Huachuca Wildlife Office, at 533-7083.

White-tailed deer are found in mountains of Fort Huachuca.

Skunk tracks Raccoon tracks

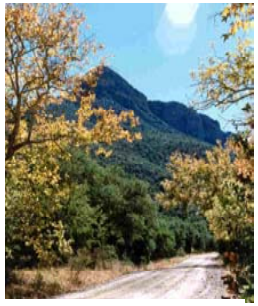
ARIZONA GAME & FISH HERITAGE FUND ARIZONA LOTTERY
LOTTERY DOLLARS WORKING FOR WILDLIFE

Be a good neighbor to Fort Huachuca's wildlife

White-nosed coati. These interesting animals are found throughout Mexico and Central America, but barely enter the U.S. They can be observed at Fort Huachuca.

Appendix 2. (cont'd).

Fort Huachuca lies nestled at the base of the Huachuca Mountains—where the Rocky Mountains meet the Sierra Madre. The Huachuca Mountains are home to an incredible diversity of plants and animals.



The Huachuca Mountains are home to an incredible diversity of wildlife.

The proximity of the housing area at Fort Huachuca to the nearby mountains literally puts a wealth of wildlife at our backdoor. Many species, including birds, skunks, raccoons, and bats are quite willing to share our neighborhoods with us, but sometimes their presence is not welcomed by everyone.

What is the problem?

Skunks and raccoons find abundant food and shelter around buildings. At the same time, their natural predators, such as owls, hawks, bobcats, and mountain lions tend to avoid people. With more food and fewer predators, skunk and raccoon numbers can get quite high. Skunks and raccoons can get and transmit rabies, and they are more likely to spread this and other diseases when their densities are high.

Some people attract deer and javelina to their yards, by intentionally leaving out food or water, or unintentionally by letting bird food spill to the ground, or leaving pet food or household garbage outside. Deer and javelina, while fun to watch, can also cause problems in the housing area, by destroying valuable plantings, and creating hazards when they dash into roads in front of cars.

Deer panicked by cars or dogs have been known to crash through windows. Frightened javelina may attack people or dogs, leaving serious wounds from their sharp teeth. In addition, mountain lions have been known to follow deer and javelina into urban neighborhoods, looking for a meal. Black bears are also attracted by garbage and pet food.

Putting out hummingbird food and bird seed to attract birds is a favorite pastime of many people. Caution must be exercised here, also. During the warmer months of the year, trichmoniasis can be spread among birds concentrated at feeders; this disease is particularly fatal to doves and pigeons. Seed that spills on the ground may attract rodents, skunks, and javelina.

House cats left to roam outside kill or injure wildlife, and may transmit disease such as rabies, distemper, and feline leukemia to wildlife. According to the American Bird Conservancy, free-ranging cats are estimated to kill hundreds of millions of birds, and more than a billion small mammals, such as rabbits and chipmunks, each year. House cats can also contract diseases from wildlife, and are easy prey for coyotes.

Javelina, also known as collared peccary, are common** residents **of Fort Huachuca.

How to be a good neighbor

- Do not leave pet food outside.
- Make sure garbage cans are secure, and do not place on curb until the morning of pickup.
- Clean up debris piles, including pallets and old tires.
- Keep house cats indoors.
- If you feed birds, make sure seed does not spill onto the ground, keep feeders very clean, and consider not feeding during the summer months to reduce disease transmission.
- Close off holes under buildings, and secure abandoned buildings, to reduce denning areas for skunks and raccoons.
- Do not keep wildlife as pets.
- Keep all wildlife at a safe distance, and NEVER feed any wildlife from your hands.
- If you need to find a new home for your pet, DO NOT release it into the wild—that is unethical, cruel, and illegal.